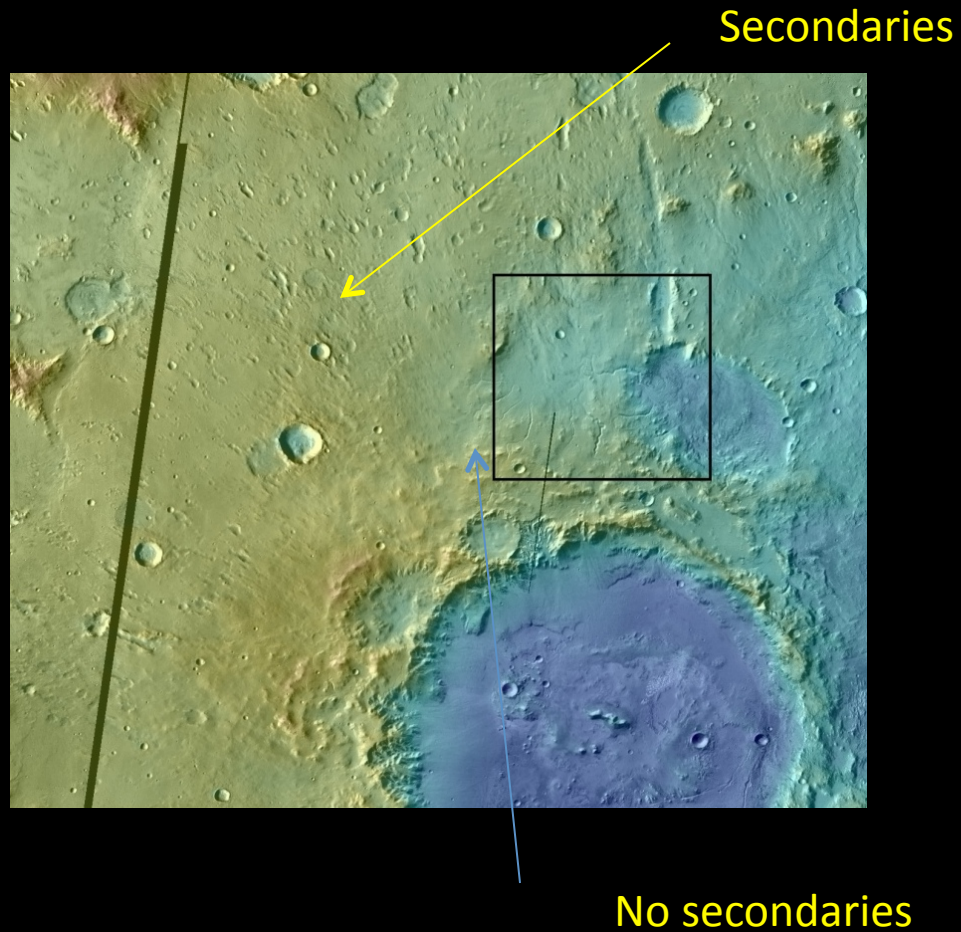


The role of Holden crater in Eberswalde fluvial activity

N. Mangold, LPG Nantes, CNRS France

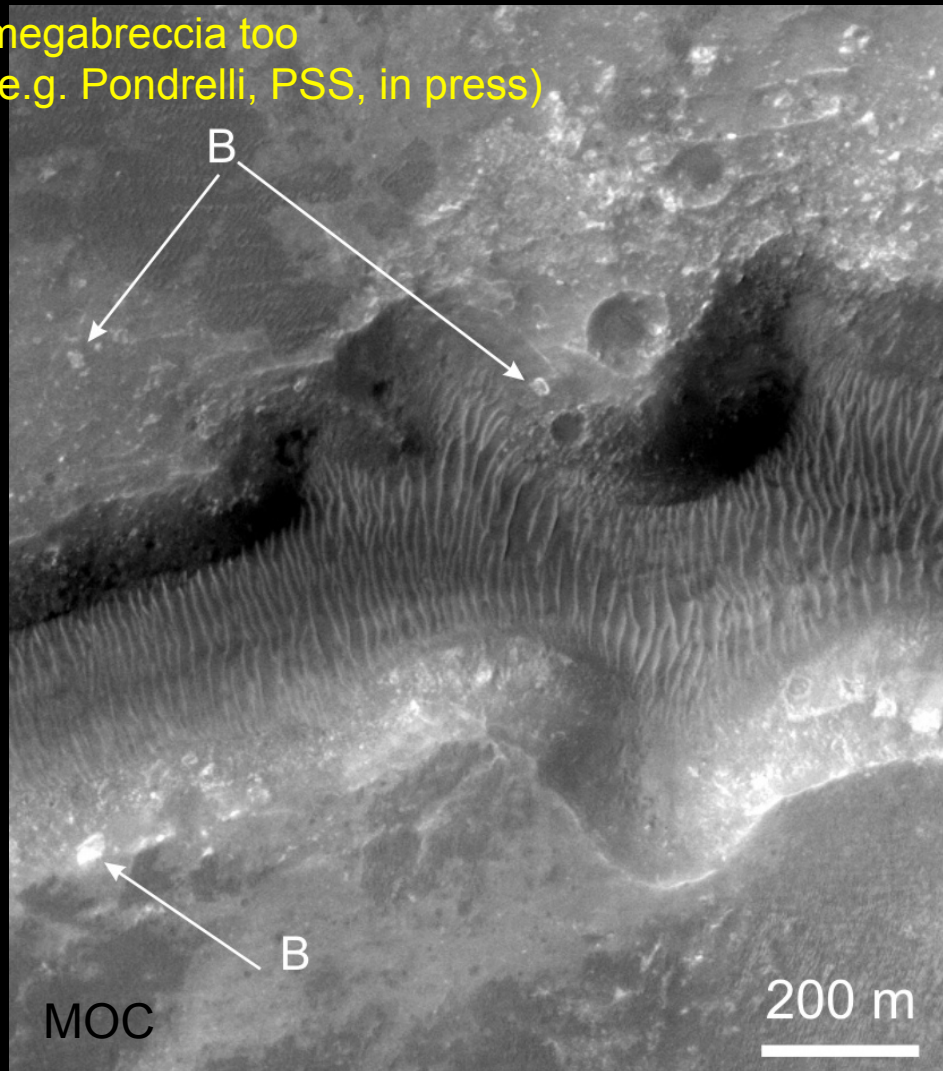
1st point: Fluvial deposits postdate Holden ejecta blanket



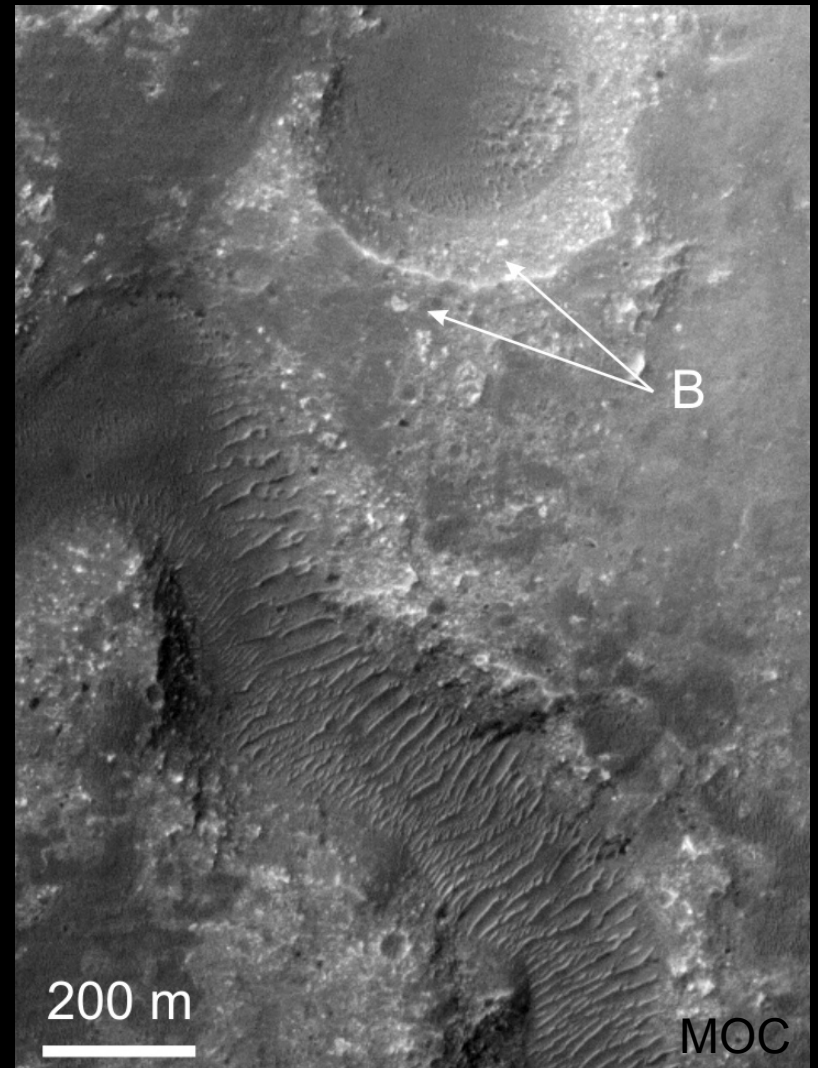
⇒ Continuous ejecta of Holden crater
exist before secondaries

1st point: Fluvial deposits postdate Holden ejecta blanket

Sediments in Eberwalde over
megabreccia too
(e.g. Pondrelli, PSS, in press)

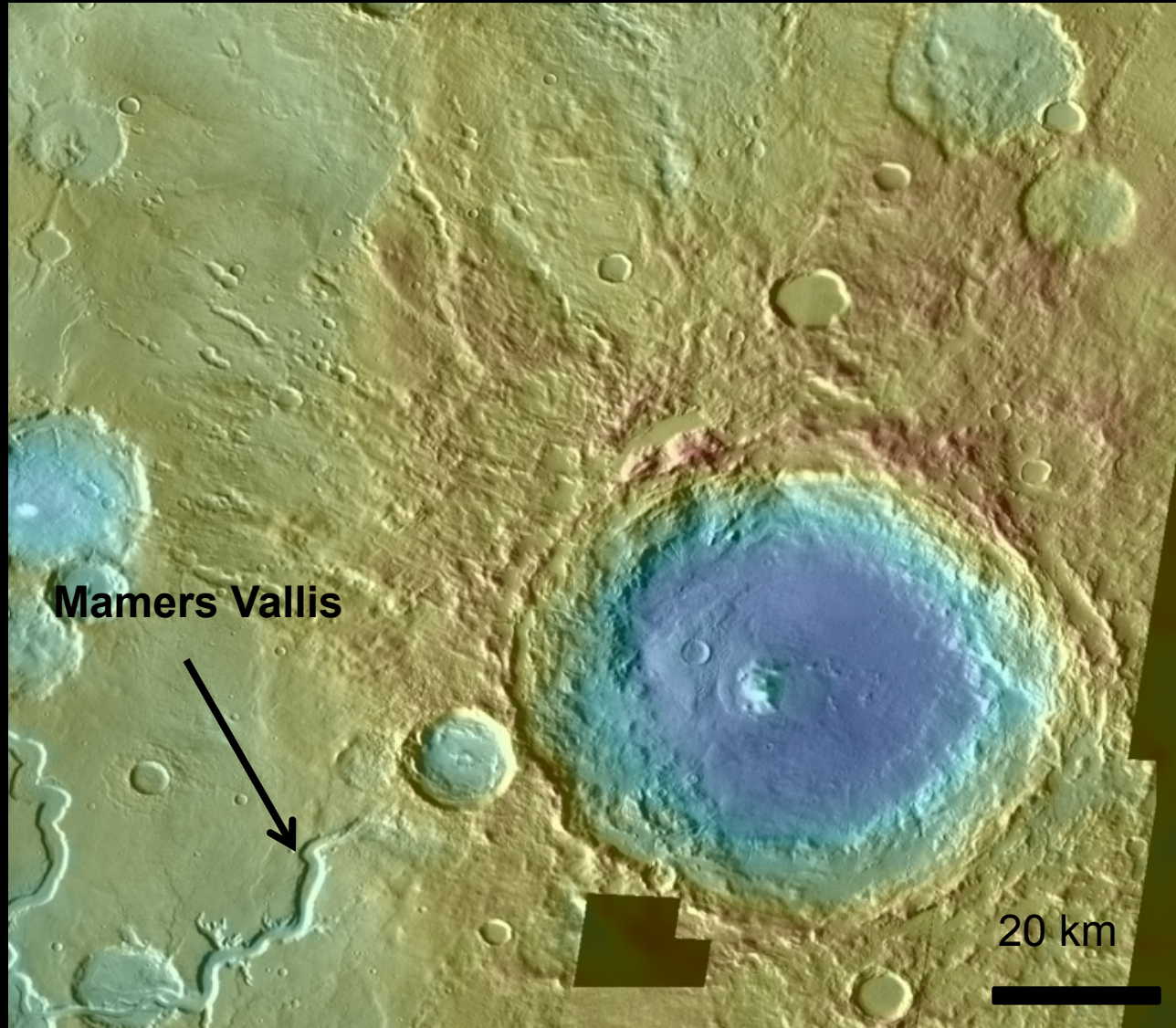


Valley crossing Holden ejecta



Valley crossing Holden ejecta

1st point: Fluvial deposits postdate Holden ejecta blanket

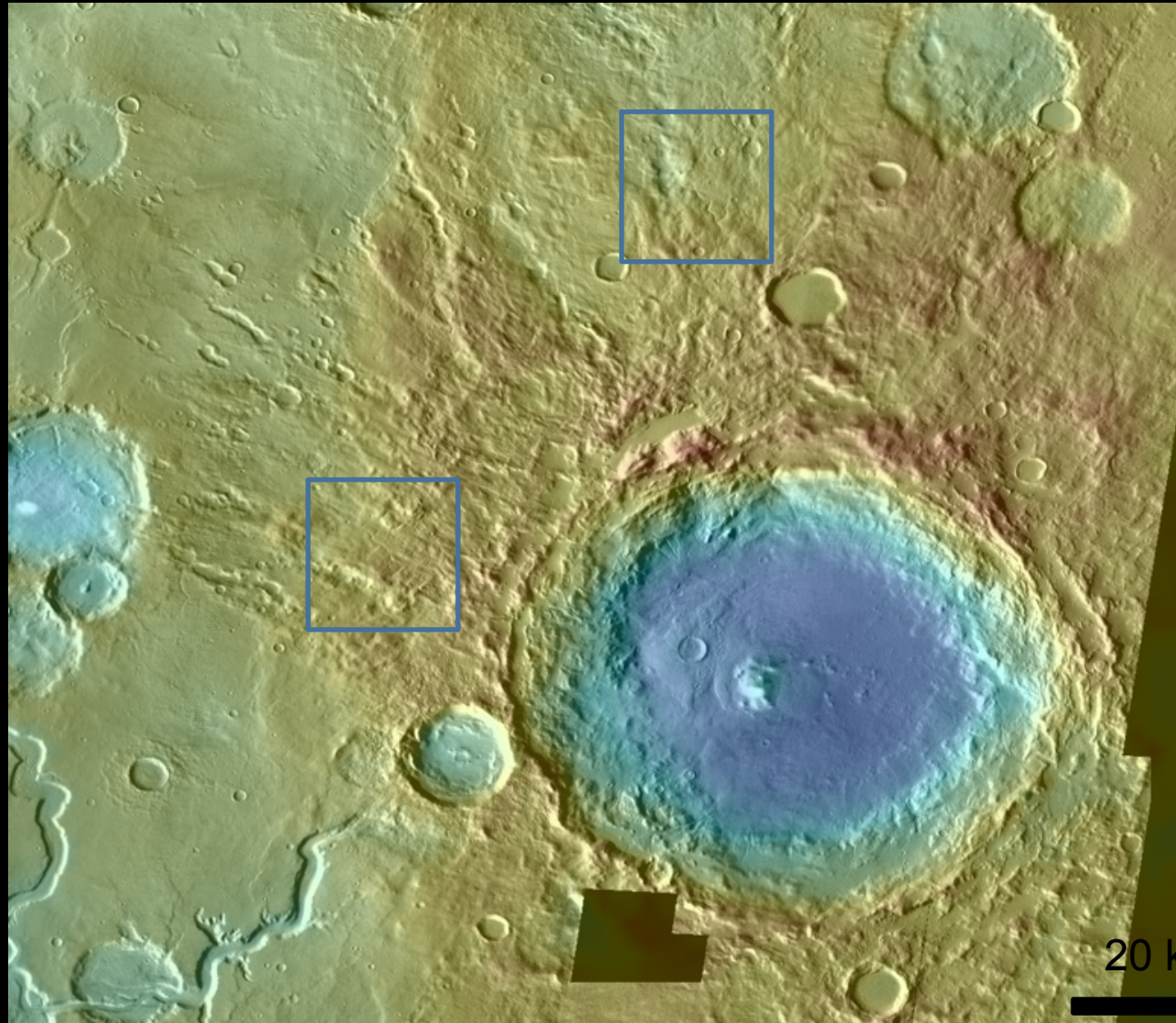


Cerulli crater
(100 km diameter)
30°North

Mamers Vallis dated
Early Hesperian

Cerulli has fresh
ejecta and an age
younger than the
Early Hesperian

1st point: Fluvial deposits postdate Holden ejecta blanket

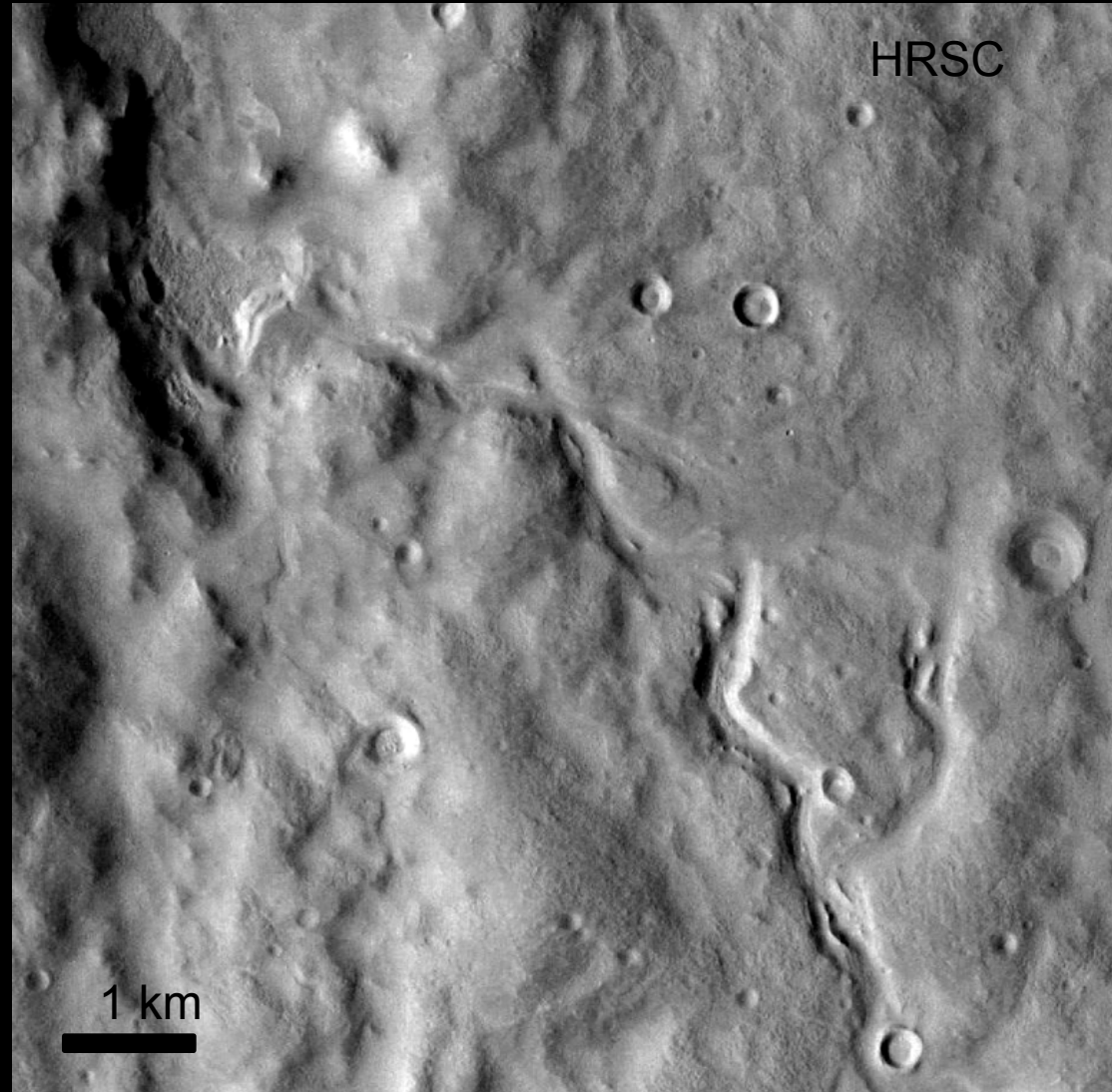


Cerulli crater
(100 km diameter)
30°North

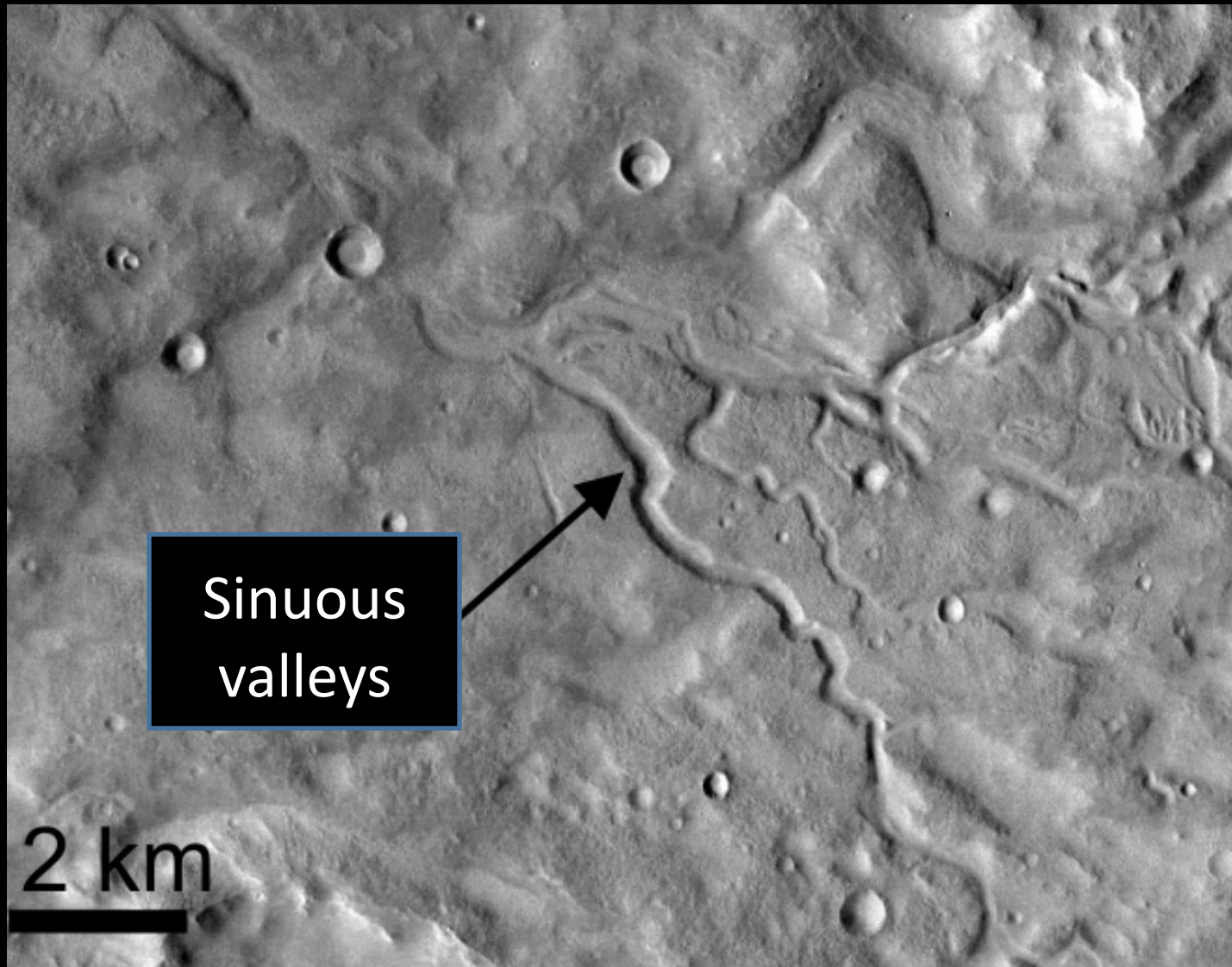
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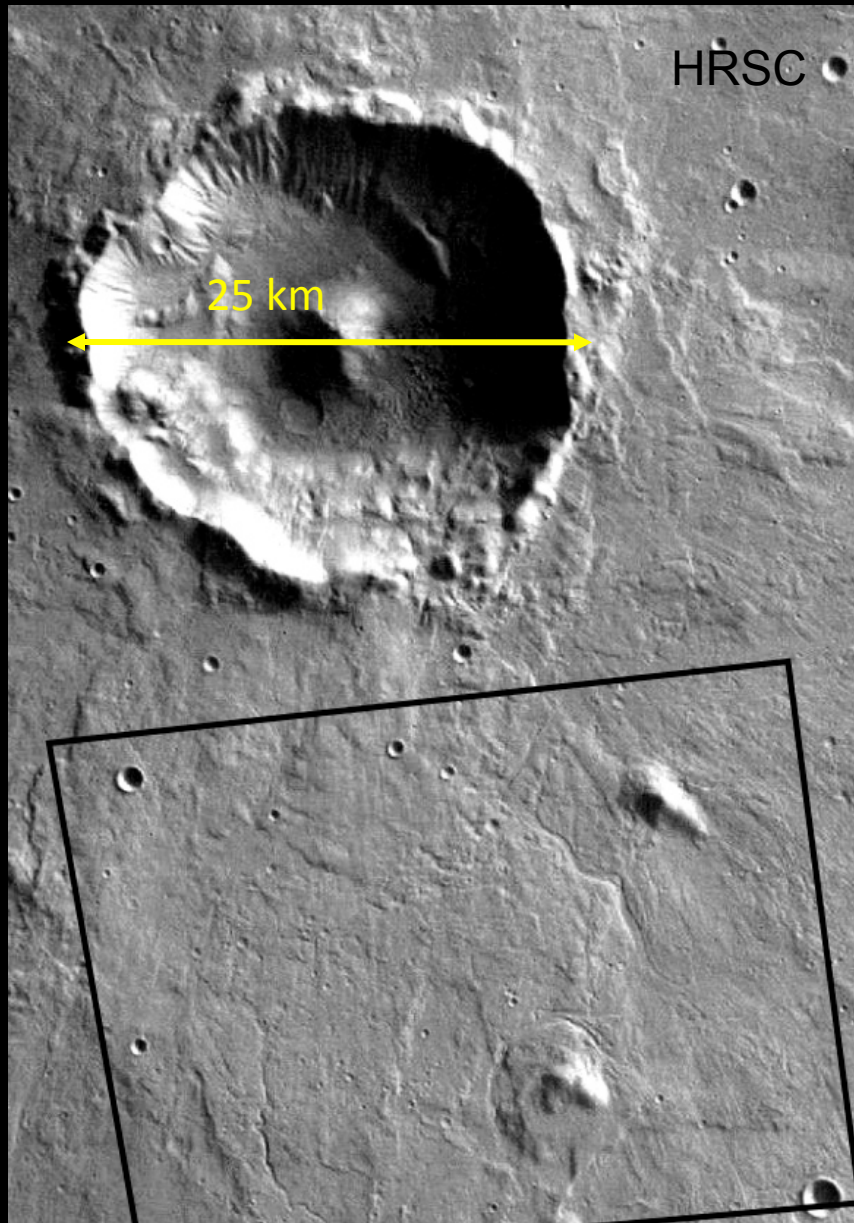
1st point: Fluvial deposits postdate Holden ejecta blanket



1st point: Fluvial deposits postdate Holden ejecta blanket



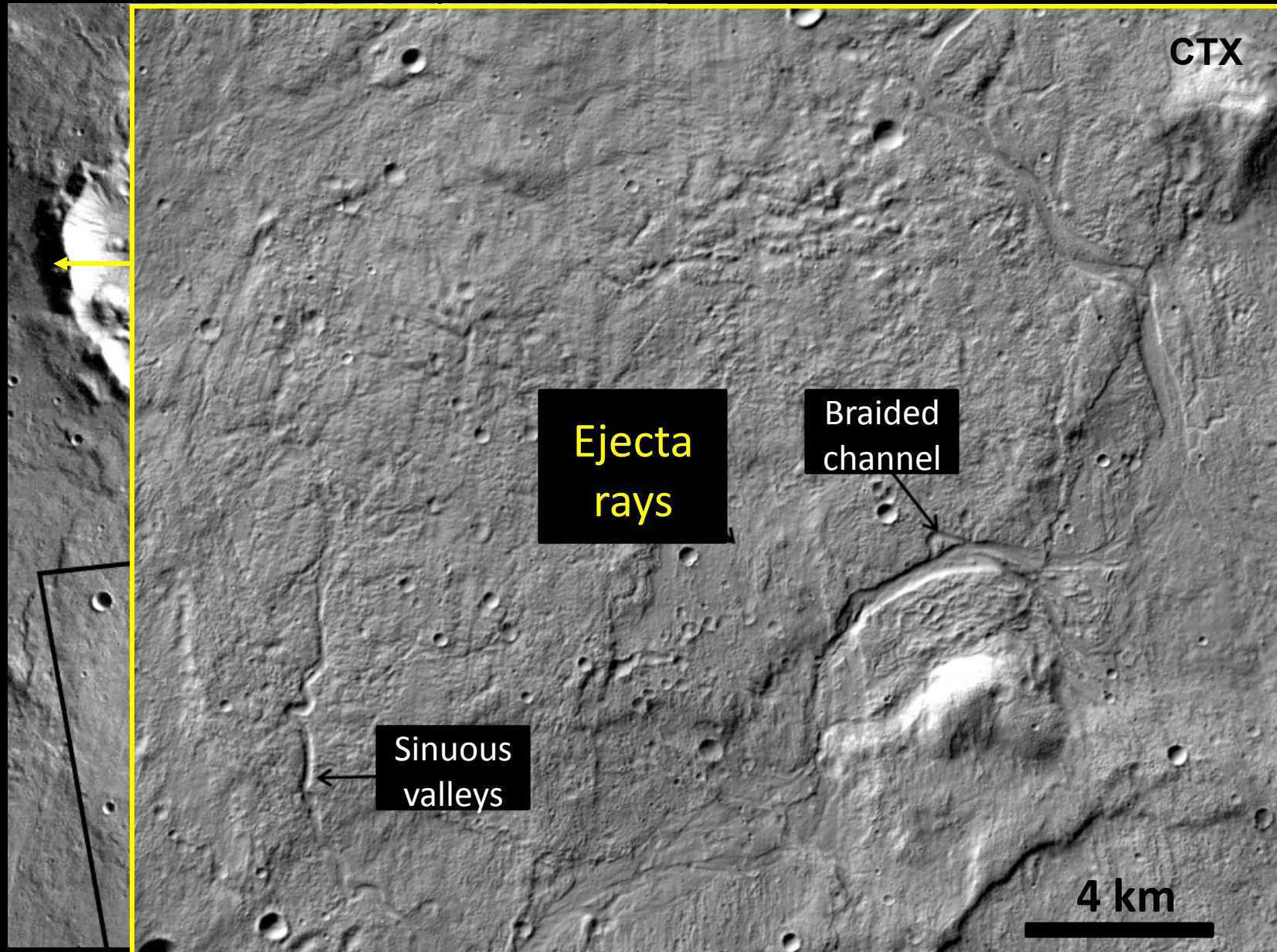
1st point: Fluvial deposits postdate Holden ejecta blanket



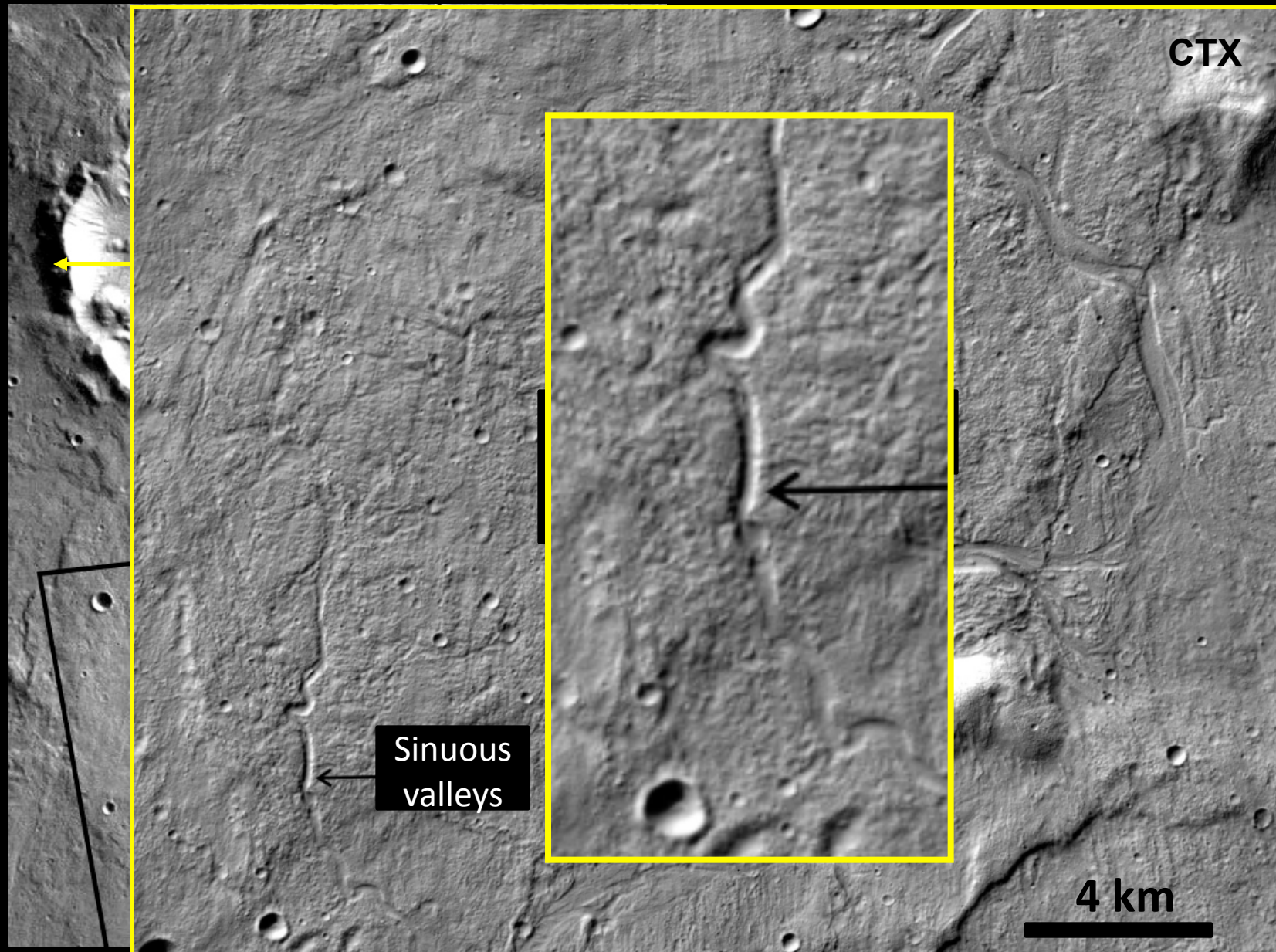
Unnamed crater 35°S

25 km in diameter

1st point: Fluvial deposits postdate Holden ejecta blanket



1st point: Fluvial deposits postdate Holden ejecta blanket



1st point: Fluvial deposits postdate Holden ejecta blanket

Implications:

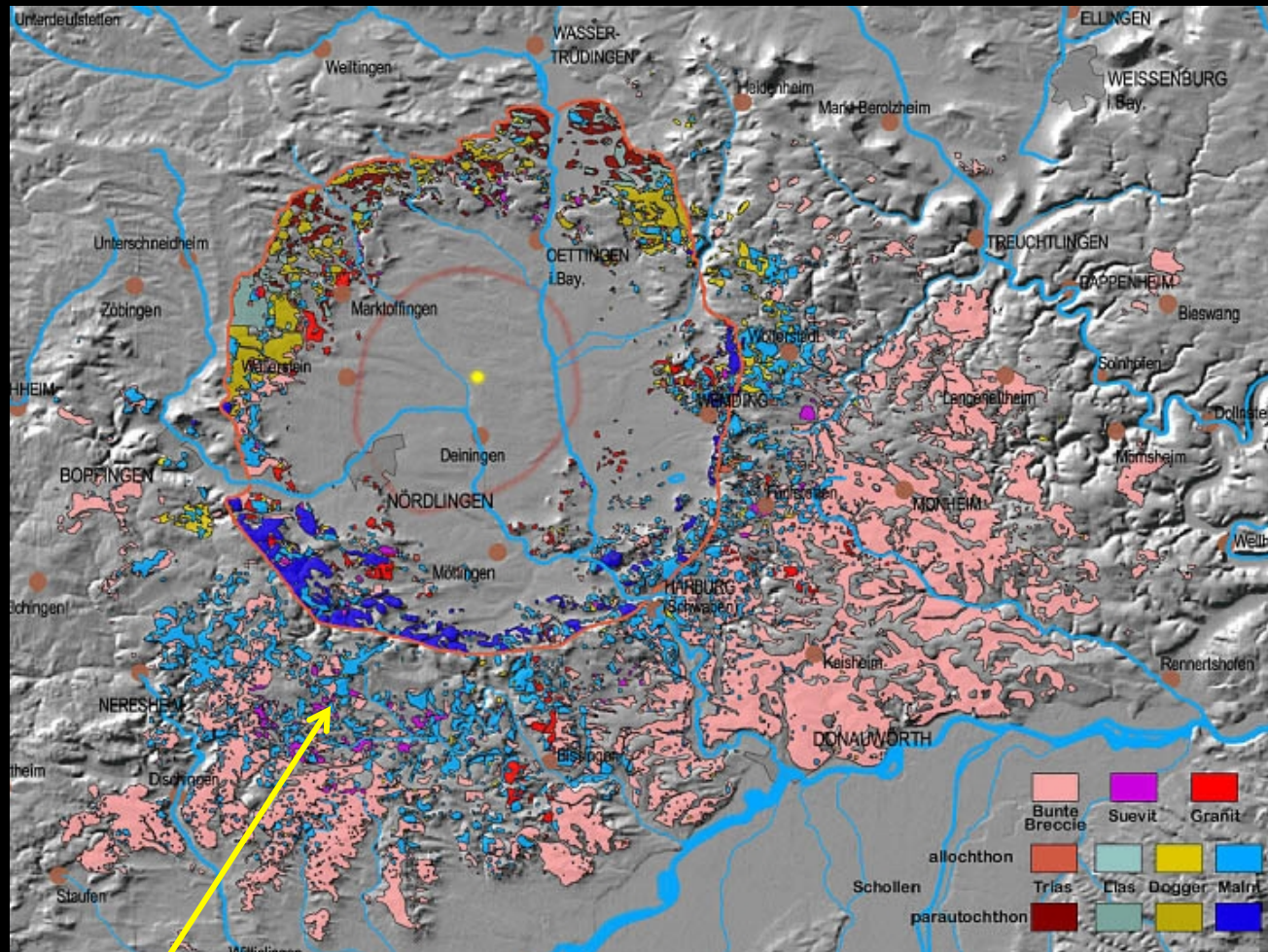
Holden is located at 25° south:

This is a latitude at which ice may have been preserved close to the surface even in a current climate

A formation of valleys and their deposits by ejecta heating and melting of shallow ice is a plausible interpretation

2nd point: Temperature of ejecta blankets

23 km diameter Ries impact in Germany



Suevite = ejecta from the Ries impact

Experienced $> 580^{\circ}$ to 700°C (above Curie Temperature) (Engelhardt et al., 1994)

3rd point: Geometry of fluvial valley system

All valleys are located on the
ejecta blanket

None of them outside!

None of them on secondaries

Jerolmack et al., GRL, 2004 :

High discharge rates for channels that may not imply precipitation

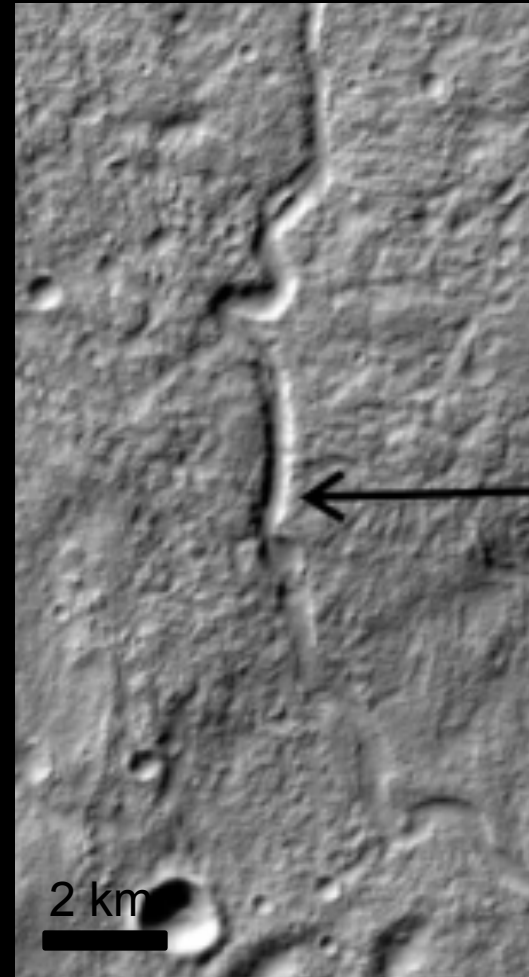
=> Role of the impact in question.

3rd point: Geometry of fluvial valley system

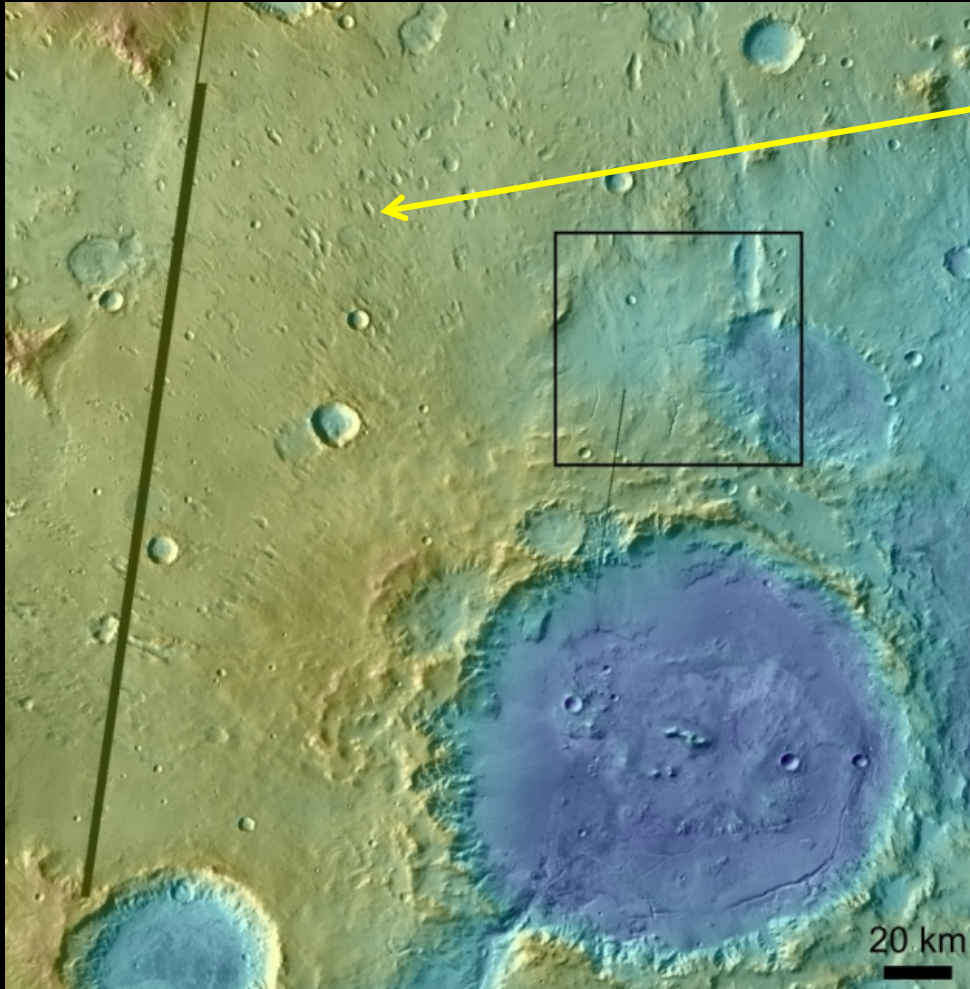
Eberswalde upstream valley



25 km unnamed crater



4th point: Holden secondaries



Some secondaries are < 500 m large

Noachian erosion rate
should have removed
these craters

⇒ Holden crater may be really late

Conclusions:

- Impact crater-related processes may be found where we did not expect

« *Remember Gusev* » (*Ray Arvidson*)

- Predictions in the ellipse:
 - Hydrothermal springs may exist in the ellipse (+)
 - Warmer temperature than expected, good for habitability (+)
 - Episodic lake with transient liquid water (-)
 - Clay minerals formed by impact processes (suevite) (-)
 - Delta fans formed by angular, poorly sorted clasts (-)

Think about it ! Thank you.